

## 8516 Naomi with Graph

As we know, Naomi is poor at math. But Naomi practices math problems every day. The following is one of them.

Naomi has a non-directed connected graph with  $n$  vertices labelled from 1 to  $n$  and  $m$  edges. The length of each edge is 1. Naomi needs to add some edges (lengths of which should be 1 as well) to the graph such that each of them connects two different vertices and minimize the cost of the graph.

We define  $dist[i]$  as the length of the shortest path between vertex 1 and vertex  $i$ . Vertex  $i$  has a value  $A[i]$ . The cost of the graph equals to

$$\sum_{i=1}^n (A[i] - dist[i])^2$$

Can you help her?

### Input

The input contains multiple test cases. No more than 20

In each test case:

- The first line contains two numbers  $n, m$ . ( $1 \leq n \leq 40, 0 \leq m \leq 1600$ )
- The following  $m$  lines each contains two numbers  $x, y$  ( $1 \leq x, y \leq n$ ) denoting that there is an edge between  $x$  and  $y$ .
- And the last line of each test case contains  $n$  numbers denoting the array  $A$ .  $0 \leq A[i] \leq 1000$

### Output

For each test case, print the minimum cost of the graph in a single line.

### Sample Input

```
4 3
1 2
2 3
3 4
0 3 3 3
```

### Sample Output

```
5
```